

(九) *N*-Substituted benzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]-quinolin-3,4-dione (124-138) 之合成

N-Benzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (124) 之合成

取化合物 **36** (2.29g , 0.01mole) 懸著於 DMF 30 ml 中 , 加入無水 K_2CO_3 (1.38 g , 0.01 mole) 加熱 (約 70-80) 使之溶解 , 加入 benzyl chloride (11.3g , 0.1mole) , 反應 1 小時後加入冰水中 , 以 $CHCl_3$ 萃取 , 取 $CHCl_3$ 層 , 以無水 $MgSO_4$ 乾燥 , 減壓濃縮後 , 收集沉澱物以短程矽膠管柱層析 ($CHCl_3/EtOH$) 沖提 , 再以 MeOH 及 $CHCl_3$ 做再結晶 , 得白色棉絮狀結晶 , 為化合物 **124** (2.20 g , 68.97 %) , mp : >300 。 光譜數據如下 : MS m/z : 319; IR (KBr) cm^{-1} : 1713.3 ($C_3=O$) , 1605.3 ($C_4=O$) ; UV λ_{max} nm (MeOH) (log ϵ): 245 (4.67) ; 1H -NMR (DMSO- d_6) δ : 1.70 (3H, t, $J=7.6$ Hz, $C_6-CH_2CH_3$) , 2.67 (2H, q, $J=7.6$ Hz, $C_6-CH_2CH_3$) , 4.92 (2H, s, H-2) , 5.56 (2H, s, H-10) , 7.25-7.36 (5H, m, Ar-H) , 7.48 (2H, d, $J=8.3$ Hz, H-7, H-8) , 8.09 (1H, d, $J=0.8$ Hz, H-5) ; ^{13}C -NMR (DMSO- d_6) δ : 15.60 ($C_6-CH_2CH_3$) , 27.53 ($C_6-CH_2CH_3$) , 46.40 (C-10) , 76.17 (C-2) , 100.29 (C-3a) , 117.28 (C-8) , 125.35 (C-8) , 126.71 (C-4a) , 126.89 (C-13, C-15) , 128.01 (C-14) , 129.13 (C-12, C-16) , 133.35 (C-5) , 135.20 (C-11) , 136.40 (C-8a) , 140.68 (C-6) , 171.55 (C-9a) , 174.45 (C-4) , 191.25 (C-3) .

N-*o*-Methylbenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (125) 之合成

取化合物 **36** (2.29g , 0.01mole) 和 *o*-methylbenzyl chloride (12.7g , 0.1mole) 為原料 , 比照化合物 **124** 的合成法及處理步驟 , 得化合物 **125** (1.48g , 44.44 %) , mp: 230-231 。 光譜數據如下 : MS m/z : 333; IR (KBr) cm^{-1} : 1721.0 ($C_3=O$) , 1605.3 ($C_4=O$) ; UV λ_{max} nm (MeOH) (log ϵ): 245 (4.69) ; 1H -NMR (DMSO- d_6) δ : 1.19 (3H, t, $J=7.6$ Hz, $C_6-CH_2CH_3$) , 2.44 (3H, s, $C_{12}-CH_3$) , 2.68 (2H, q, $J=7.6$ Hz, $C_6-CH_2CH_3$) , 4.86 (2H, s, H-2) , 5.48 (2H, s, H-10) , 6.64 (1H, d, $J=7.5$ Hz, H-7) , 6.03-7.40 (4H, m, Ar-H) , 7.50 (1H, d, $J=7.5$ Hz, H-8) , 8.04 (1H, d, $J=1.5$ Hz, H-5) ; ^{13}C -NMR (DMSO- d_6) δ : 15.58 ($C_6-CH_2CH_3$) , 18.91 ($C_{12}-CH_3$) , 28.52 ($C_6-CH_2CH_3$) , 44.90 (C-10) , 76.14 (C-2) , 100.33 (C-3a) , 117.24 (C-8a) , 124.22 (C-7) , 125.33 (C-15, C-4a) , 126.58 (C-14) , 127.60 (C-13) , 130.69 (C-16) , 132.80 (C-11) , 133.48 (C-5) , 135.32 (C-12) , 136.56 (C-8a) , 140.74 (C-6) , 171.65 (C-9a) , 174.62 (C-4) , 191.19 (C-3) .

N-*m*-Methylbenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (126) 之合成

取化合物 **36** (2.29g , 0.01mole) 和 *m*-methylbenzyl chloride (12.7g , 0.1mole) 為原料 , 比照化合物 **124** 的合成法及處理步驟 , 得化合物 **126** (2.01g , 60.36 %) , mp: 199~201 。 光譜數據如下 : MS m/z : 333; IR (KBr) cm^{-1} : 1721.0 ($C_3=O$) , 1605.3 ($C_4=O$) ; UV λ_{max} nm (MeOH) (log ϵ): 246 (4.50) ; 1H -NMR (DMSO- d_6) δ : 1.66 (3H, t, $J=7.5$ Hz, $C_6-CH_2CH_3$) , 2.25 (3H, s, $C_{13}-CH_3$) , 2.67 (2H, q, $J=7.6$ Hz,

C₆-CH₂CH₃), 4.91 (2H, s, H-2), 5.50 (2H, s, H-10), 7.03-7.22 (4H, m, Ar-H), 7.53 (2H, s, H-7, H-8), 8.00 (1H, s, H-5); ¹³C-NMR (DMSO-*d*₆) δ: 15.57 (C₆-CH₂CH₃), 21.18 (C₁₃-CH₃), 27.52 (C₆-CH₂CH₃), 46.42 (C-10), 76.15 (C-2), 100.30 (C-3a), 117.27 (C-8), 123.88 (C-7), 125.31 (C-4a), 126.69 (C-16), 127.26 (C-14), 128.69 (C-15), 129.02 (C-12), 133.36 (C₅), 135.11 (C-11), 136.44 (C-13), 138.45 (C-8a), 140.65 (C-6), 171.58 (C-9a), 174.43 (C-4), 191.29 (C-3).

***N-p*-Methylbenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (127) 之合成**

取化合物 36 (2.29g, 0.01mole) 和 *p*-methylbenzyl chloride (12.7g, 0.1mole) 為原料, 比照化合物 124 的合成法及處理步驟, 得化合物 127 (2.45, 73.57%), mp: 182-184。光譜數據如下: MS *m/z*: 333; IR (KBr) cm⁻¹: 1721.0 (C₃=O), 1605.3 (C₄=O); UV λ_{max} nm (MeOH) (log ε): 245 (4.74); ¹H-NMR (DMSO-*d*₆) δ: 1.16 (3H, t, J=7.6 Hz, C₆-CH₂CH₃), 2.24 (3H, s, C₁₄-CH₃), 2.67 (2H, q, J=7.6 Hz, C₆-CH₂CH₃), 4.91 (2H, s, H-2), 5.50 (2H, s, H-10), 7.13 (2H, d, J=8.0 Hz, H-13, H-15), 7.24 (2H, d, J=8.0 Hz, H-12, H-16), 7.54 (2H, s, H-7, H-8), 8.00 (1H, s, H-5); ¹³C-NMR (DMSO-*d*₆) δ: 15.51 (C₆-CH₂CH₃), 20.84 (C₁₄-CH₃), 27.53 (C₆-CH₂CH₃), 46.23 (C-10), 76.14 (C-2), 100.27 (C-3a), 117.32 (C-8), 125.31 (C-7), 126.69 (C-4a), 126.90 (C-13, C-15), 129.66 (C-12, C-16), 132.12 (C-11), 133.31 (C-5), 136.38 (C-8a), 137.32 (C-14), 140.66 (C-6), 171.55 (C-9a), 174.39 (C-4), 191.26 (C-3).

***N-m*-Methoxybenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (128) 之合成**

取化合物 36 (2.29g, 0.01mole) 和 *m*-methoxybenzyl chloride (14.3g, 0.1mole) 為原料, 比照化合物 124 的合成法及處理步驟, 得化合物 128 (2.11g, 60.46%), mp: 200~203。光譜數據如下: MS *m/z*: 349; IR (KBr) cm⁻¹: 1728.8 (C₃=O), 1613.0 (C₄=O); UV λ_{max} nm (MeOH) (log ε): 245 (4.55); ¹H-NMR (DMSO-*d*₆) δ: 1.73 (3H, t, J=7.6 Hz, C₆-CH₂CH₃), 2.68 (2H, q, J=7.6 Hz, C₆-CH₂CH₃), 3.71 (3H, s, C₁₃-OCH₃), 4.91 (2H, s, H-2), 5.51 (2H, s, H-10), 6.82-7.24 (4H, m, Ar-H), 7.54 (2H, s, H-7, H-8), 8.01 (1H, s, H-5); ¹³C-NMR (DMSO-*d*₆) δ: 15.59 (C₆-CH₂CH₃), 27.53 (C₆-CH₂CH₃), 46.36 (C-10), 55.30 (C₁₃-OCH₃), 76.17 (C-2), 100.28 (C-3a), 113.00 (C-14), 113.01 (C-16), 117.27 (C-12), 118.6 (C-8), 125.33 (C-7), 126.67 (C-4a), 130.36 (C-13), 133.37 (C-5), 136.45 (C-8a), 136.75 (C-11), 140.71 (C-6), 159.81 (C-13), 171.59 (C-9a), 174.45 (C-4), 191.27 (C-3).

***N-p*-Methoxybenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (129) 之合成**

取化合物 36 (2.29g, 0.01mole) 和 *p*-methoxybenzyl chloride (14.3g, 0.1mole) 為原料, 比照化合物 124 的合成法及處理步驟, 得化合物 129 (2.63g, 75.36%), mp: 220-223。光譜數據如下: MS *m/z*: 349; IR (KBr) cm⁻¹: 1713.3 (C₃=O), 1605.3 (C₄=O); UV λ_{max} nm (MeOH) (log ε): 245 (4.36); ¹H-NMR (DMSO-*d*₆) δ: 1.17 (3H,

t, $J=7.6$ Hz, $C_6-CH_2CH_3$), 2.67 (2H, q, $J=7.6$ Hz, $C_6-CH_2CH_3$), 2.69 (3H, s, $C_{14}-OCH_3$), 4.92 (2H, s, H-2), 5.49 (2H, s, H-10), 6.89 (2H, d, $J=8.7$ Hz, H-12, H-16), 7.31 (2H, d, $J=8.7$ Hz, H-13, H-15), 7.52-7.58 (2H, s, H-7, H-8), 8.08 (1H, d, $J=1.8$ Hz, H-5); $^{13}C-NMR$ (DMSO- d_6) δ : 15.61 ($C_6-CH_2CH_3$), 27.53 ($C_6-CH_2CH_3$), 45.93 (C-10), 55.31 ($C_{14}-OCH_3$), 75.13 (C-2), 100.28 (C-3a), 114.49 (C-12, C-16), 117.36 (C-8), 125.32 (C-7), 126.73 (C-4a), 126.94 (C-11), 128.47 (C-13, C-15), 133.30 (C-5), 136.35 (C-8a), 140.65 (C-6), 159.04 (C-14), 171.56 (C-9a), 174.35 (C-4), 191.26 (C-3).

***N*-*o*-Chlorobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (130) 之合成**

取化合物 36 (2.29g, 0.01mole) 和 *o*-chlorobenzyl chloride (14.7g, 0.1mole) 為原料, 比照化合物 124 的合成法及處理得化合物 130 (1.92g, 54.39%), mp: 239-240。光譜數據如下: MS m/z : 353; IR (KBr) cm^{-1} : 1721.0 ($C_3=O$), 1605.3 ($C_4=O$); UV λ_{max} nm (MeOH) (log ϵ): 243 (4.92); ^1H-NMR (DMSO- d_6) δ : 1.18 (3H, t, $J=7.5$ Hz, $C_6-CH_2CH_3$), 2.09 (2H, q, $J=7.5$ Hz, $C_6-CH_2CH_3$), 4.87 (2H, s, H-2), 5.55 (2H, s, H-10), 6.98 (1H, d, $J=7.6$ Hz, H-8), 7.19-7.59 (5H, m, Ar-H, H-7), 8.00 (1H, d, $J=1.1$ Hz, H-5); $^{13}C-NMR$ (DMSO- d_6) δ : 15.57 ($C_6-CH_2CH_3$), 27.53 ($C_6-CH_2CH_3$), 44.76 (C-10), 76.26 (C-2), 100.49 (C-3a), 116.77 (C-8), 125.46 (C-7), 126.64 (C-4a), 127.33 (C-15), 128.12 (C-14), 129.78 (C-13), 130.01 (C-16), 131.65 (C-12), 132.17 (C-11), 133.58 (C-5), 136.42 (C-8a), 140.84 (C-6), 171.63 (C-9a), 174.68 (C-4), 191.14 (C-3).

***N*-*m*-Chlorobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (131) 之合成**

取化合物 36 (2.29g, 0.01mole) 和 *m*-chlorobenzyl chloride (14.7g, 0.1mole) 為原料, 比照化合物 124 的合成法及處理步得化合物 131 (2.52g, 71.39%), mp: 218-220。光譜數據如下: MS m/z : 353; IR (KBr) cm^{-1} : 1713.3 ($C_3=O$), 1613.0 ($C_4=O$); UV λ_{max} nm (MeOH) (log ϵ): 244 (4.87); ^1H-NMR (DMSO- d_6) δ : 1.17 (3H, t, $J=7.6$ Hz, $C_6-CH_2CH_3$), 2.67 (2H, q, $J=7.6$ Hz, $C_6-CH_2CH_3$), 4.90 (2H, s, H-2), 5.56 (2H, s, H-10), 7.26-7.53 (6H, m, Ar-H, H-7, H-8), 8.01 (1H, d, $J=1.0$ Hz, H-5); $^{13}C-NMR$ (DMSO- d_6) δ : 15.55 ($C_6-CH_2CH_3$), 27.52 ($C_6-CH_2CH_3$), 45.88 (C-10), 76.22 (C-2), 100.45 (C-3a), 117.10 (C-8), 125.48 (C-4a, C-7), 126.72 (C-16), 126.87 (C-14), 128.08 (C-12), 131.01 (C-15), 133.40 (C-5), 133.79 (C-13), 136.31 (C-8a), 137.80 (C-11), 140.73 (C-6), 171.58 (C-9a), 174.54 (C-4), 191.28 (C-3).

***N-p*-Chlorobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (132) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 4-chlorobenzyl chloride (14.7g , 0.1mole) 為原料, 比照化合物 **124** 的合成法及處理步驟, 得化合物 **132** (2.65g , 75.07 %), mp:262-264 。光譜數據如下: MS m/z : 353; IR (KBr) cm^{-1} : 1721.0 ($\text{C}_3=\text{O}$), 1605.3 ($\text{C}_4=\text{O}$); UV λ_{max} nm (MeOH) (log ϵ): 245 (4.67); $^1\text{H-NMR}$ (DMSO- d_6) δ : 1.56 (3H, t, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 2.66 (2H, q, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 4.90 (2H, s, H-2), 5.55 (2H, s, H-10), 7.39 (4H, s, Ar-H), 7.53 (2H, s, H-7, H-8), 7.99 (1H, s, H-5); $^{13}\text{C-NMR}$ (DMSO- d_6) δ : 15.56 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 27.51 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 45.79 (C-10), 76.17 (C-2), 100.36 (C-3a), 117.14 (C-8), 125.39 (C-7), 126.70 (C-4a), 128.90 (C-13, C-15), 129.05 (C-12, C-16), 132.65 (C-14), 133.36 (C-5), 134.26 (C-11), 136.27 (C-8a), 140.70 (C-6), 171.54 (C-9a), 174.45 (C-4), 191.22 (C-3) .

***N-o*-Fluorobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (133) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 *o*-fluorobenzyl chloride (13.1g , 0.1mole) 為原料, 比照化合物 **124** 的合成法及處理步驟, 得化合物 **133** (2.10g , 62.31 %), mp:205-206 。光譜數據如下: MS m/z : 337; IR (KBr) cm^{-1} : 1713.3 ($\text{C}_3=\text{O}$), 1613.0 ($\text{C}_4=\text{O}$); UV λ_{max} nm (MeOH) (log ϵ): 245 (4.65); $^1\text{H-NMR}$ (DMSO- d_6) δ : 1.18 (3H, t, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 2.68 (2H, q, $J=7.6$ Hz, $\text{C}_7\text{-CH}_2\text{CH}_3$), 4.90 (2H, s, H-2), 5.59 (2H, s, H-10), 7.12-7.55 (6H, m, Ar-H, H-7, H-8), 8.09 (1H, d, $J=1.8$ Hz, H-5); $^{13}\text{C-NMR}$ (DMSO- d_6) δ : 15.24 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 27.88 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 41.11 (C-10), 75.58 (C-2), 100.47 (C-3a), 115.45 (C-13), 115.67 (C-15), 116.10 (C-8), 120.90 (C-11), 121.17 (C-14), 124.95 (C-5), 126.78 (C-4a), 127.69 (C-6), 130.15 (C-16), 133.22 (C-7), 135.94 (C-8a), 141.41 (C-12), 172.43 (C-9a), 174.45 (C-4), 190.49 (C-3) .

***N-m*-Fluorobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (134) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 *m*-fluorobenzyl chloride (13.1g , 0.1mole) 為原料, 比照化合物 **124** 的合成法及處理步驟, 得化合物 **134** (2.31g , 68.55 %), mp:214-216 。光譜數據如下: MS m/z : 337; IR (KBr) cm^{-1} : 1721.0 ($\text{C}_3=\text{O}$), 1605.3 ($\text{C}_4=\text{O}$); UV λ_{max} nm (MeOH) (log ϵ): 244 (4.89); $^1\text{H-NMR}$ (DMSO- d_6) δ : 1.16 (3H, t, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 2.67 (2H, q, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 4.90 (2H, s, H-2), 5.57 (2H, s, H-10), 7.12-7.40 (4H, m, Ar-H), 7.53 (2H, s, H-7, H-8), 8.01 (1H, s, H-5); $^{13}\text{C-NMR}$ (DMSO- d_6) δ : 15.55 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 27.52 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 45.96 (C-10), 76.21 (C-2), 100.43 (C-3a), 113.79 (C-14), 114.71 (C-12), 115.13 (C-16), 117.10 (C-8), 122.91 (C-15), 125.39 (C-7), 126.72 (C-4a), 131.27 (C-11), 133.36 (C-5), 136.32 (C-13), 138.20 (C-8a), 140.71 (C-6), 171.58 (C-9a), 174.51 (C-4), 191.28 (C-3) .

***N-p*-Fluorobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (135) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 *p*-fluorobenzyl chloride (13.1g , 0.1mole) 為原料, 比照化合物 **124** 的合成法及處理步驟, 得化合物 **135** (2.63g , 78.04 %), mp: 238-240 。光譜數據如下: MS *m/z*: 337; IR (KBr) cm^{-1} : 1713.3 ($\text{C}_3=\text{O}$), 1605.3 ($\text{C}_4=\text{O}$); UV λ_{max} nm (MeOH) (log ϵ): 245 (4.53); $^1\text{H-NMR}$ (DMSO- d_6) δ : 1.17 (3H, t, $J=7.5$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 2.65 (2H, q, $J=7.5$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 4.90 (2H, s, H-2), 5.54 (2H, s, H-10), 7.12-7.21 (2H, m, H-13, H-15), 7.39-7.46 (2H, m, H-7, H-8), 7.55 (2H, s, H-12, H-16), 8.00 (1H, s, H-5); $^{13}\text{C-NMR}$ (DMSO- d_6) δ : 15.62 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 27.53 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 45.74 (C-10), 76.19 (C-2), 100.37 (C-3a), 115.74 (C-15), 116.16 (C-13), 117.23 (C-7), 125.40 (C-5), 126.74 (C-4a), 129.12 (C-12), 129.29 (C-16), 131.43 (C-11, C-14), 133.38 (C-8), 136.30 (C-8a), 140.73 (C-6), 171.57 (C-9a), 174.44 (C-4), 191.29 (C-3) .

***N-o*-Nitrobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (136) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 *o*-nitrobenzyl chloride (15.8g , 0.1mole) 為原料, 比照化合物 **124** 的合成法及處理步驟, 得化合物 **136** (2.41g , 66.21 %), mp: 240-242 。光譜數據如下: MS *m/z*: 364; IR (KBr) cm^{-1} : 1728.8 ($\text{C}_3=\text{O}$), 1605.3 ($\text{C}_4=\text{O}$); UV λ_{max} nm (MeOH) (log ϵ): 244 (log $\epsilon=4.73$); $^1\text{H-NMR}$ (DMSO- d_6) δ : 1.18 (3H, t, $J=7.5$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 2.68 (2H, q, $J=7.5$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 4.84 (2H, s, H-2), 5.91 (2H, s, H-10), 7.03-7.08 (1H, m, H-16), 7.50 (2H, s, H-7, H-8), 7.58-7.63 (2H, m, H-14, H-15), 8.03 (1H, s, H-5), 8.25-8.30 (1H, m, H-13); $^{13}\text{C-NMR}$ (DMSO- d_6) δ : 15.56 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 27.53 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 45.18 (C-10), 76.24 (C-2), 100.58 (C-3a), 117.24 (C-8), 125.36 (C-7), 125.98 (C-13), 126.64 (C-4a), 127.19 (C-14), 129.25 (C-16), 130.59 (C-11), 133.46 (C-5), 135.01 (C-15), 136.46 (C-8a), 140.85 (C-6), 147.38 (C-12), 171.73 (C-9a), 174.87 (C-4), 191.13 (C-3) .

***N-m*-Nitrobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (137) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 *m*-nitrobenzyl chloride (15.8g , 0.1mole) 為原料, 比照化合物 **124** 的合成法及處理步驟, 得化合物 **137** (2.75g , 75.55 %), mp: 237-239 。光譜數據如下: MS *m/z*: 364; IR (KBr) cm^{-1} : 1713.3 ($\text{C}_3=\text{O}$), 1605.3 ($\text{C}_4=\text{O}$); UV λ_{max} nm (MeOH) (log ϵ): 245 (4.60); $^1\text{H-NMR}$ (DMSO- d_6) δ : 1.17 (3H, t, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 2.68 (2H, q, $J=7.6$ Hz, $\text{C}_6\text{-CH}_2\text{CH}_3$), 4.90 (2H, s, H-2), 5.71 (2H, s, H-10), 7.55 (2H, s, H-7, H-8), 7.62 (1H, d, $J=7.9$ Hz, H-16), 7.72 (1H, d, $J=7.9$ Hz, H-15), 8.02 (1H, s, H-5), 8.14 (1H, d, $J=8.0$ Hz, H-14), 8.31 (1H, s, H-12); $^{13}\text{C-NMR}$ (DMSO- d_6) δ : 15.54 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 27.51 ($\text{C}_6\text{-CH}_2\text{CH}_3$), 45.76 (C-10), 76.26 (C-2), 100.51 (C-3a), 117.05 (C-8), 122.06 (C-7), 123.01 (C-14), 125.48 (C-4a), 126.73 (C-12), 130.75 (C-15), 133.24 (C-16), 133.49 (C-5), 136.26 (C-11), 137.60 (C-8a), 140.84 (C-6), 148.30 (C-13), 171.62 (C-9a), 174.64

(C-4) , 191.26 (C-3) .

***N-p*-Nitrobenzyl-6-ethyl-2,3,4,9-tetrahydrofuro[2,3-*b*]quinolin-3,4-dione (138) 之合成**

取化合物 **36** (2.29g , 0.01mole) 和 *p*-nitrobenzyl chloride (15.8g , 0.1mole) 為原料 , 比照化合物 **124** 的合成法及處理步驟得化合物 **138** (2.92g , 80.22 %) , mp : >300 。光譜數據如下 : MS *m/z*: 364; IR (KBr) cm^{-1} : 1716.8 (C₃=O) , 1612.6 (C₄=O) ; UV λ_{max} nm (MeOH) (log ϵ): 245 (4.74); ¹H-NMR (DMSO-*d*₆) δ : 1.67(3H, t, J=7.5 Hz, C₆-CH₂CH₃) , 2.68 (2H, q, J=7.5 Hz, C₆-CH₂CH₃) , 4.90 (2H, s, H-2) , 5.72(2H, s, H-10) , 7.52 (2H, m, H-7, H-8), 7.61 (2H, d, J=8.6 Hz, H-12, H-16) , 8.03 (1H, s, H-5), 8.18 (2H, d, J=8.6 Hz, H-13, H-15) ; ¹³C-NMR (DMSO-*d*₆) δ : 15.60 (C₆-CH₂CH₃) , 27.51 (C₆-CH₂CH₃) , 45.93 (C-10) , 76.24 (C-2) , 100.47 (C-3a) , 117.02 (C-8) , 124.17 (C-13, C-15) , 125.49 (C-7) , 126.71 (C-4a) , 128.12 (C-12, C-16) , 133.47 (C-5) 136.26 (C-8a) , 140.87 (C-6) , 143.01 (C-11) , 147.27 (C-14) , 171.60 (C-9a) , 174.58 (C-4) , 191.23 (C-3) .